# NAVAL HEALTH RESEARCH CENTER

# *THE RESUPPLY VALIDATION PROGRAM (RSVP): A SYSTEMS REPORT*


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# The ReSupply Validation Program (RSVP):
## A Systems Report

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# The ReSupply Validation Program (RSVP): A Systems Report

## Introduction

The United States Marine Corps (USMC) has changed its doctrine and policy to achieve more flexible and effective combat operations. To accomplish this goal (as expressed in Operational Maneuver From the Sea), Concept of Naval Force Protection for the 21st Century, Joint Vision 2020, Marine Corps Strategy 21, and Sea Power 21 illustrate the need for highly mobile medical units with improved responsiveness.[1-5] The success of such units is impossible without the development of more modular, flexible, and efficient Authorized Medical Allowance List/Authorized Dental Allowance List (AMAL/ADAL) configurations that match the speed and mobility of USMC contingency response operations.

The development of such streamlined AMALs/ADALs requires improvement in the medical resupply process. Currently, USMC is sustained with preconfigured AMALs/ADALs: when some of the supplies within an AMAL are exhausted, the entire block is resupplied rather than only those items that have been depleted. This process assumes the same consumption rate for each line item in the block. When in theater, consumption rates vary significantly depending on the patient stream. As a result, USMC unnecessarily expends resources in the form of supply overstock as well as in storing, maintenance, and transportation of these additional supplies.

To streamline the resupply process, the Naval Health Research Center (NHRC) expanded the Estimating Supplies Program (ESP), a program that estimates the supplies required to treat a particular patient stream, into a tool called the ReSupply Validation Program (RSVP). RSVP is a software program designed for Navy and Marine Corps planners and logisticians as (1) a simulation tool that models the delivery and consumption of a medical supply inventory over a series of time intervals, and (2) a research tool that can help determine the optimal configuration and delivery schedule of medical supplies for any type of operation. RSVP links the resupply process to the demands of the patient stream, providing

users with the ability to tailor their resupply to meet the needs of a specific mission.

This document explains what RSVP does, how it works, and why it is useful for the medical planning and logistics communities.

## Background

In the 1990s, NHRC designed the supply review model that established a valid configuration for a single AMAL/ADAL by mapping patient conditions (PCs) to medical tasks to the individual supplies needed to perform those task.[6-15] USMC requested that NHRC use this same process to determine the total materiel requirement for a defined patient stream, this time mapping the quantity of PCs to the individual supply item quantities.

NHRC first evaluated how the current AMAL configurations served a user-defined patient stream. NHRC developed a patient stream using ESP, which incorporated patient probabilities from the ground casualty projection system FORECAS. Eight thousand three hundred and thirty-one patients (the notional number of patients for which the current AMALs are configured) were entered into ESP and distributed over 350 PCs. ESP then generated the consumable supplies and equipment necessary for treating these patients. The analysis showed that the consumption rates of each item in the AMAL vary significantly. In fact, current inventory levels of approximately 70% of the consumable supply items exceeded the actual requirements of the defined patient stream.

After discovering the excess in the original AMAL configuration, NHRC proposed to simulate the consumption of an ESP-generated inventory that was linked to a patient stream. The goal was to assess whether the necessary items and quantities were available to treat patients as they arrived into the health care system. To achieve this goal, several capabilities were incorporated into ESP: the ability to time phase the patient stream and inventory, the ability to decrement supply quantities from an inventory as they were used, and an expanded selection of reports. NHRC named the new program RSVP to acknowledge its new functionality. The results of the simulation showed that the RSVP time-phased inventory would be successful in

treating the patient stream while at the same time reducing supply overstock and, therefore, the resources required to store, maintain, and transport that overstock.

For a detailed description of the development of RSVP from ESP, see NHRC Technical Report 03-18, "The ReSupply Validation Program (RSVP): Developing ESP Into a Tool That Validates Patient-Driven Fleet Marine Force Medical Resource Requirements." [16]

## Description of RSVP

**Underlying Data**

Because RSVP was developed from ESP, the two programs share the same database and are installed at the same time. For RSVP to run properly, the most current version of ESP must also be installed on the same machine. When using RSVP, users select scenarios that were generated in ESP, either preestablished ones or ones they created themselves.

RSVP offers the following levels of care and their respective functional areas (FAs): First Responder, Battalion Aid Station (BAS), Forward Resuscitative Surgery System (FRSS), Surgical Company (SC), En Route Care, Small Ships/Independent Duty Corpsman, Landing Ship Dock/General Medical Officer, and Preventive Medicine. RSVP also has the treatment briefs developed by the Joint Readiness Clinical Advisory Board.

RSVP has two primary functions: to create an inventory and simulate its use. The user enters scenario parameters and RSVP calculates supplies according to stochastic principles, which means it generates inventories by randomly choosing the arrival times and PCs of each patient. Once it creates the patient stream, RSVP identifies supplies consumed by those patients, then, over time, decrements the quantity of each item from the supply block. The user can see which supplies will last throughout the scenario.

These two functions, Inventory Generation and the Consumption Simulator, are explained in greater detail below.

## Inventory Generation

The Inventory Generation function is used to generate and schedule the delivery of a resupply inventory based on the arrival of the patient stream. This function has three screens, each with its own tab: Scenario, Functional Area Laydown, and Generate Inventory.

### Scenario Screen

In the Scenario screen, the user enters the following parameters to define the scenario: the number of patients, the number of days in theater, and the number of resupply periods (see Figure 1).

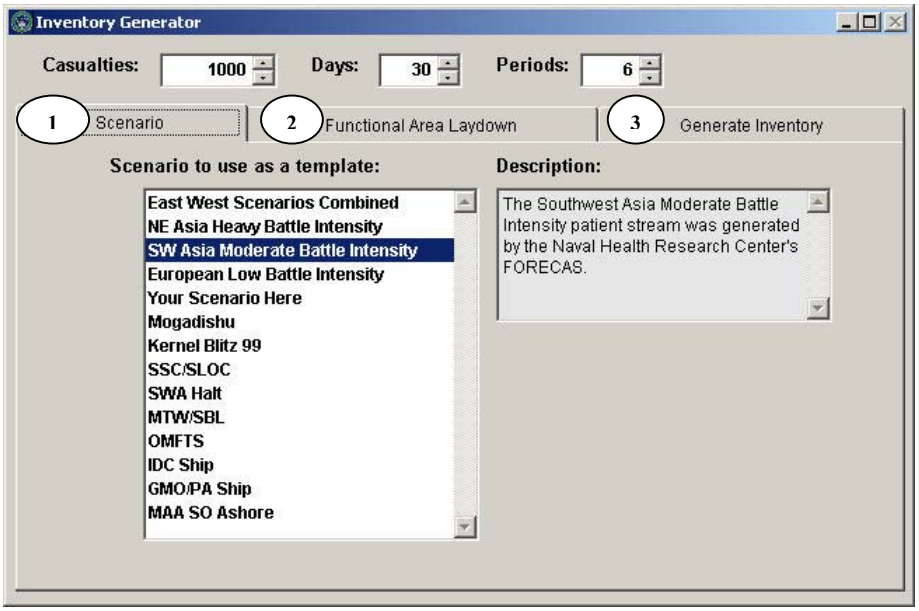


Figure 1. The Scenario screen.

Next, the user selects a scenario. The scenario, as previously mentioned, is originally built in ESP where the user selects the levels of care, the FAs, and the PCs those functional areas are expected to treat. Therefore, the scenario the user selects in RSVP determines the FAs for which the inventory is built as well as the types of patient stream the inventory is suited to treat.

### Functional Area Laydown Screen

Next the user clicks the Functional Area Laydown tab to select the FAs for the scenario (see Figure 2). The list of FAs are those that were selected when the user

built the scenario in ESP. The user specifies how many of each FA to supply. At least one FA must be selected to execute RSVP.

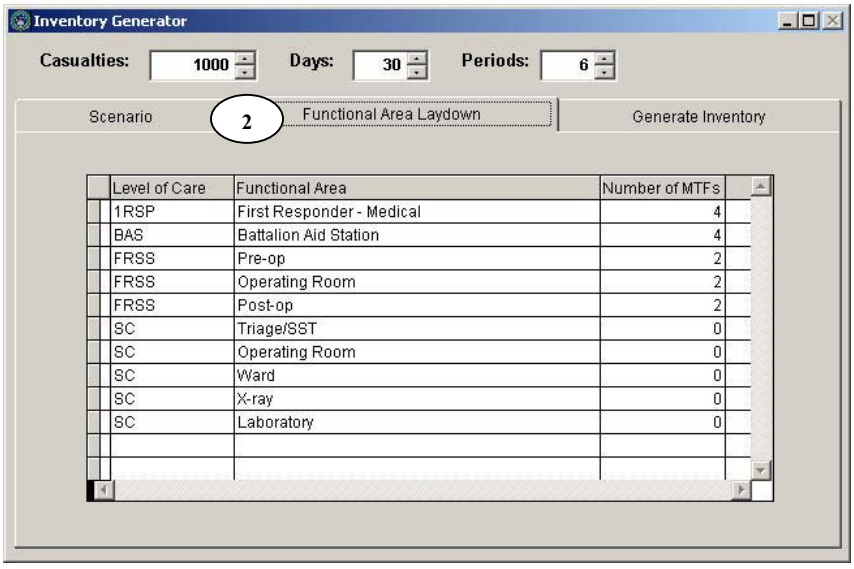


Figure 2. The Functional Area Laydown screen.

### Generate Inventory Screen

The user then clicks the Generate Inventory tab. In this screen, the user enters the number of days in each period and the percentage of casualties expected to arrive during each period. Once the days and percentages are entered, RSVP creates a bar graph to display the percentage of patients expected to occur in each period.

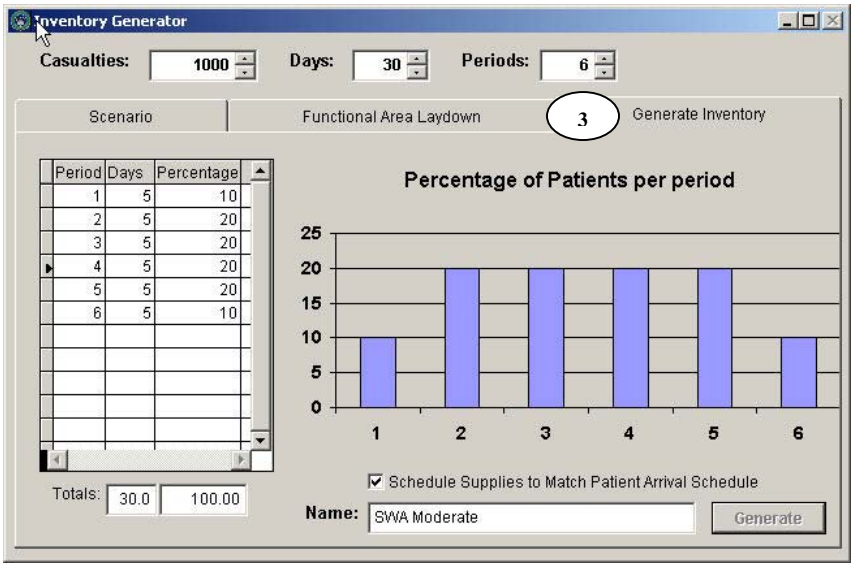


Figure 3. The Generate Inventory screen.

This feature allows the user to model supply delivery while taking into account mission constraints. Based on the knowledge of the type of operation, the location, the terrain, the number and types of available transportation assets, and storage capabilities, the user can adjust how much of the inventory arrives during each period. RSVP uses these percentages to divide the inventory into shipments: if 10% of the casualties are expected in period 1, then 10% of the inventory is sent at the beginning of the period. The user can change the period days and percentages, which in turn changes the bar graph upon leaving the grid.

Once the user types in the inventory Name and clicks the Generate button in the Generate Inventory screen, RSVP generates 100 stochastic iterations of the patient stream. For each iteration, RSVP generates a patient stream based on the percentages of occurrence in the scenario.

Next, each PC's iterations are ordered on patient quantity from highest to lowest. The 80th percentile quantity is chosen for each PC. Then, RSVP identifies the quantity that matches the 80th percentile, aggregates the patient stream, and generates the supplies to treat those patients.

For example, Figure 4 shows 5 iterations of a patient stream. PC 001 appears 2 times in the first iteration, 1 in the second, 4 in the third, 3 in the fourth, and 1 in the fifth. These quantities are then rank ordered. The 80th percentile, which is 3, would be used to generate the supplies to treat that PC.

**Sample Patient Stream**

| Iteration | PC 001 | PC 002 | PC 003 |
|---|---|---|---|
| 1 | 2 | 1 | 3 |
| 2 | 1 | 2 | 1 |
| 3 | 4 | 0 | 4 |
| 4 | 3 | 0 | 0 |
| 5 | 1 | 1 | 1 |

**Rank-Ordered Sample Patient Stream**

| Percentile | PC 001 | PC 002 | PC 003 |
|---|---|---|---|
| 100 | 4 | 2 | 4 |
| **80** | **3** | **1** | **3** |
| 60 | 2 | 1 | 1 |
| 40 | 1 | 1 | 1 |
| 20 | 1 | 0 | 0 |

Figure 4. Sample Iterations of a Patient Stream.

## Inventory Reports

RSVP generates 7 inventory reports, some of which detail elements of the scenario and patient stream, and others that are concerned principally with supplies.

The scenario and patient description reports are:

- Scenario Description
- Patient Stream by Category
- Patient Stream

The reports detailing lists of supplies for the patient stream are:

- Total Calculated Supply Requirements – Units of Measure
- Time-Phased ReSupply Sorted by Functional Area Then Supply
- Time-Phased ReSupply Sorted by Supply Then Functional Area
- Time-Phased ReSupply Sorted by Supply Totaled Across Functional Area – Unit of Issue

The Scenario Description report (see Figure 5) lists the user inputs for the scenario: the name, the selected FAs, the first and last day of each period, and the total number of patients divided into the number of periods. This report is useful for seeing the user inputs at a glance.

Scenario Description

**Supply List:** SWA Moderate
**Number of days:** 30 **Number of runs:** 100 **Percentile:** 80

**Based on Scenario:** SW Asia Moderate Battle Intensity
The Southwest Asia Moderate Battle Intensity patient stream was generated by the Naval Health Research Center's FORECAS.

**Functional Areas:** 4 1RSP First Responder - Medical, 4 BAS Battalion Aid Station, 2 FRSS Pre-op, 2 FRSS Operating Room, 2 FRSS Post-op

| Period | First day | Last day | Patients |
|---|---|---|---|
| 1 | 1 | 5 | 100 |
| 2 | 6 | 10 | 200 |
| 3 | 11 | 15 | 200 |
| 4 | 16 | 20 | 200 |
| 5 | 21 | 25 | 200 |
| 6 | 26 | 30 | 100 |
| | **Total Patients:** | | 1000 |

Figure 5. The Scenario Description report.

**Patients by Category**

Inventory: SWA Moderate

| Category | Number of Patients |
|---|---|
| Abdomen & Pelvis | 65 |
| Battle Fatigue | 220 |
| Burns | 62 |
| Cardiovascular | 19 |
| Directed Energy Weapon Eye Lesion | 15 |
| Environmental | 19 |
| Eye/Ear Disease | 35 |
| Gastrointestinal | 109 |
| General | 2 |
| Genitourinary | 52 |
| Head | 125 |
| Infectious/Parasitic | 70 |
| Lower Limbs | 215 |
| Multiple Injury Wounds | 245 |
| Miscellaneous | 13 |
| Neuropsychiatric | 43 |
| Not Assigned | 10 |
| Respiratory | 75 |
| Sexually Transmitted Disease | 8 |
| Spine | 21 |
| Sprains & Strains | 91 |
| Superficial/Soft Tissue | 325 |
| Surgical | 62 |
| Thorax | 19 |
| Upper Limbs | 243 |
| Dermatological | 91 |
| Total | 2254 |

Figure 6. Patient Stream by Category report.

The Patient Stream by Category report (see Figure 6) lists the number of patients within each patient category. The patient categories are those defined by the Joint Readiness Clinical Advisory Board. This report is useful for seeing the frequency of occurrence by types of patients.

The Patient Stream report (see Figure 7) lists the patients in order by PC code. This report is useful for identifying whether a particular PC is in the scenario.

Patient Stream used for Calculations

Inventory: SWA Moderate

| Patient Condition | | Number of Patients |
|---|---|---|
| 1 | CEREBRAL CONCUSSION CLOSED WITH/WITHOUT NONDEPRESSED LINEAR SKULL FRACTURE SEVERE - LOSS OF CONSCIOUSNESS FROM 2 TO 12 HOURS | 6 |
| 2 | CEREBRAL CONCUSSION CLOSED WITH/WITHOUT NONDEPRESSED LINEAR SKULL FRACTURE MODERATE - LOSS OF CONSCIOUSNESS LESS THAN 2 HOURS | 16 |
| 3 | CEREBRAL CONTUSION CLOSED WITH/WITHOUT NONDEPRESSED LINEAR SKULL FRACTURE SEVERE - LOSS OF CONSCIOUSNESS GREATER THAN 24 HOURS WITH FOCAL NEUROLOGICAL DEFICIT | 2 |
| 4 | CEREBRAL CONTUSION CLOSED WITH/WITHOUT NONDEPRESSED LINEAR SKULL FRACTURE MODERATE - LOSS OF CONSCIOUSNESS FROM 12-24 HOURS WITHOUT FOCAL NEUROLOGICAL DEFICIT | 6 |
| 5 | CEREBRAL CONTUSION CLOSED WITH INTRACRANIAL HEMATOMA WITH/WITHOUT NON- DEPRESSED LINEAR SKULL FRACTURE - SEVERE - LARGE HEMATOMA (INCLUDING EPIDURAL HEMATOMA) WITH RAPIDLY DETERIORATING COMATOSE PATIENT | 4 |
| 6 | CEREBRAL CONTUSION CLOSED WITH NONDEPRESSED LINEAR SKULL FACTURE SEVERE - LOSS OF CONSCIOUSNESS GREATER THAN 24 HOURS WITH/WITHOUT FOCAL NEUROLOGICAL DEFICIT | 3 |
| 7 | CEREBRAL CONTUSION CLOSED WITH DEPRESSED SKULL FRACTURE SEVERE - WITH ASSOCIATED INTRACEREBRAL HEMATOMA AND/OR MASSIVE DEPRESSION | 3 |
| 8 | CEREBRAL CONTUSION CLOSED WITH DEPRESSED SKULL FRACTURE MODERATE - NO ASSOCIATED HEMATOMA OR SIGNIFICANT EFFECT FROM DEPRESSION | 2 |
| 9 | CEREBRAL CONTUSION WITH OPEN SKULL FRACTURE SEVERE - WITH INTRACRANIAL FRAGMENTS AND/OR DEPRESSED SKULL FRACTURE; EYELID AND EYEBALL LACERATION WITH RETAINED INTRAOCULAR FOREIGN BODY | 8 |
| 10 | CEREBRAL CONTUSION WITH OPEN SKULL FRACTURE MODERATE - WITHOUT INTRACRANIAL FRAGMENTS AND/OR DEPRESSED SKULL FRACTURE | 7 |
| 13 | WOUND SCALP OPEN WITHOUT CEREBRAL INJURY OR SKULL FRACTURE SEVERE - SCALPED WITH AVULSION OF TISSUE | 18 |
| 14 | WOUND SCALP OPEN WITHOUT CEREBRAL INJURY OR SKULL FRACTURE MODERATE - SCALP LACERATION | 17 |
| 15 | FRACTURE FACIAL BONES CLOSED EXCLUSIVE OF MANDIBLE SEVERE - MULTIPLE FRACTURES | 3 |

Figure 7. Patient Stream report.

The Total Calculated by Supply Requirements report (see Figure 8) is an alphabetical list of supplies for the given patient stream. The supplies are grouped by FA and includes the National Stock Number (NSN), supply nomen, and unit of measure (UM) quantity. This is useful for viewing the total supply needs for each FA.

Calculated Supplies for SWA Moderate

**1RSP First Responder - Medical**

**Set:** Non Set Supplies

| Nsn | Nomen | UM Qty |
|---|---|---|
| 6505009857301 | ACETAMINOPHEN TABLETS 0.325GM 1000S | 2278.0000 |
| 6510002036010 | ADHESIVE TAPE SURG 12INx5YDS MOLESKIN | 0.0000 |
| 6515011676637 | AIRWAY NASOPHARYNGEAL ROBERTAZZI 30FR 12S | 10.8000 |
| 6515009582232 | AIRWAY PHARYNGEAL BERMAN DESIGN 80MM 12S | 54.0000 |
| 6515011649637 | AIRWAY PHARYNGEAL CUT AWAY FLANGE 30FR 30S | 43.2000 |
| 6505014731770 | ALUMINUM MAGNESIUM TABS 100S | 467.0000 |
| 6510012787002 | APPLICATOR IMPREG w/BENZOIN 4IN LG 500S | 16.0000 |
| 6515009051473 | APPLICATOR PLASTIC/WOOD ROD 6IN LG 2000S | 192.5000 |
| 6505001009985 | ASPIRIN TABS .32GM 100S (ACLS protocol only) | 7.0000 |
| 6510009137909 | BANDAGE ADHESIVE FLESH 3x.75IN 300S | 17.0000 |
| 6510001055807 | BANDAGE ELASTIC COBAN FLESH 3" X 5YD 24S | 438.5000 |
| 6510009355823 | BANDAGE ELASTIC ROLLED ACE 6INx4.5YDS 12S | 192.7500 |
| 6510000583047 | BANDAGE GAUZE KERLIX 4.5IN x 4YDS 100S | 2517.1500 |
| 6510002011755 | BANDAGE MUSLIN CAMOUFLAGE 37x37x52IN 1S | 440.2500 |
| 6505014213787 | BENZOCAINE MENTH CETYLPYRD LOZENGES 648S | 144.0000 |
| 6505014437607 | BISMUTH SUBSALICYLATE TABLETS CHEWABLE 30S | 920.0000 |
| 6515013909627 | CATHETER & NEEDLE UNIT IV 14GAx1.25IN 200S | 394.0500 |
| 6515013909654 | CATHETER & NEEDLE UNIT IV 18GAx1.25IN 200S | 231.2500 |
| 6515013909650 | CATHETER & NEEDLE UNIT IV 20GAx1.25IN 200S | 111.0000 |
| 6505010235011 | CLOTRIMAZOLE CREAM USP 1% 15GM | 14.0000 |
| 6530014644424 | COMPRESS COLD INSTANT NON-TOXIC 80S | 23.0000 |
| 6515013738659 | COVER ELECTRONIC THERMOMETER DISP 100S | 405.4000 |
| 6515003245500 | DEPRESSOR TONGUE WOOD 6x.75IN STR 100S | 140.0000 |
| 6505001168350 | DIPHENHYDRAMINE HCL CAPSULES 50MG 100S | 24.0000 |
| 6510014575844 | DRESSING BURN 8x18IN w/WATER-GEL 20S | 120.0000 |
| 6510014001920 | DRESSING CHEST WOUND SEAL ASHERMAN 10S | 150.7500 |
| 6510002017425 | DRESSING FIRST AID FIELD CAMO 11x12IN | 316.0000 |

Figure 8. The Total Calculated by Supply Requirements – Units of Measure report.

The Time-Phased ReSupply Sorted by Functional Area Then Supply report (see Figure 9) tells medical planners whether a supply lasts the duration of the scenario.

Time Phased ReSupply sorted by FA then supply

SWA Moderate

**Functional Area: 1RSP First Responder - Medical** **MTFs:** 4

**NSN:** 6505009857301 **From FA:** First Responder - Medical **Qty/Pkg:** 1000.000

**Nomen** ACETAMINOPHEN TABLETS 0.325GM 1000S

| | Period1 | Period2 | Period3 | Period4 | Period5 | Period6 |
|---|---|---|---|---|---|---|
| UM Qty | 227.800 | 455.600 | 455.600 | 455.600 | 455.600 | 227.800 |
| UI Qty | 4000.000 | 4000.000 | 4000.000 | 4000.000 | 4000.000 | 4000.000 |
| UI- | 4000.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

**Required Qty:** 2278.0000 **Order qty:** 4000.000 **Num Pkgs:** 4

**NSN:** 6510002036010 **From FA:** First Responder - Medical **Qty/Pkg:** 1.000

**Nomen** ADHESIVE TAPE SURG 12INx5YDS MOLESKIN

| | Period1 | Period2 | Period3 | Period4 | Period5 | Period6 |
|---|---|---|---|---|---|---|
| UM Qty | 0.080 | 0.160 | 0.160 | 0.160 | 0.160 | 0.080 |
| UI Qty | 4.000 | 4.000 | 4.000 | 4.000 | 4.000 | 4.000 |
| UI- | 4.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

**Required Qty:** 0.8000 **Order qty:** 4.000 **Num Pkgs:** 4

Figure 9. Time-Phased ReSupply Sorted by Functional Area Then Supply report

The report categorizes each supply by UM, unit of issue (UI), and unit of issue reduced (UI-) for each FA.

UM is the amount of supply required to treat the patient stream. UI is the amount of the supply required to treat the patient stream rounded up to the nearest package size. UI- subtracts the amount of the supply already in the inventory, so that an additional order will not be placed. This report shows how different methods of packaging supplies affects the quantity required during each period throughout a scenario.

UI amounts carry over from period to period, such that if the supply is packaged in units of 12, and only 5 are needed for period one and 5 for period six, 2 units of 12 each will not be ordered (creating an inventory of 24), but rather the original package of 12 will cover both periods.

The Time-Phased ReSupply Sorted by Supply Then Functional Area report (see Figure 10) lists each supply and all the FAs in which it is used. The report displays the UM, UI, and UI- quantities for each period. This report is useful for viewing the demand for a particular supply for all FAs at once.

Time Phased ReSupply sorted by supply then FA

SWA Moderate

**6505009857301 ACETAMINOPHEN TABLETS 0.325GM 1000S**

| | Period1 | Period2 | Period3 | Period4 | Period5 | Period6 |
|---|---|---|---|---|---|---|
| 1RSP First Responder - Medical | | | | | | **MTFs: 4** |
| UM Qty | 227.800 | 455.600 | 455.600 | 455.600 | 455.600 | 227.800 |
| UI Qty | 4000.000 | 4000.000 | 4000.000 | 4000.000 | 4000.000 | 4000.000 |
| UI- | 4000.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| BAS Battalion Aid Station | | | | | | **MTFs: 4** |
| UM Qty | 544.000 | 1088.000 | 1088.000 | 1088.000 | 1088.000 | 544.000 |
| UI Qty | 4000.000 | 4000.000 | 4000.000 | 4000.000 | 4000.000 | 4000.000 |
| UI- | 4000.000 | 0.000 | 0.000 | 0.000 | 4000.000 | 0.000 |

**Required Qty:** 7718.0000 **Qty/Pkg:** 1000.000 **Order qty:** 12000.000 **Pkgs:** 12

**6510002036010 ADHESIVE TAPE SURG 12INx5YDS MOLESKIN**

| | Period1 | Period2 | Period3 | Period4 | Period5 | Period6 |
|---|---|---|---|---|---|---|
| 1RSP First Responder - Medical | | | | | | **MTFs: 4** |
| UM Qty | 0.080 | 0.160 | 0.160 | 0.160 | 0.160 | 0.080 |
| UI Qty | 4.000 | 4.000 | 4.000 | 4.000 | 4.000 | 4.000 |
| UI- | 4.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| BAS Battalion Aid Station | | | | | | **MTFs: 4** |
| UM Qty | 0.080 | 0.160 | 0.160 | 0.160 | 0.160 | 0.080 |
| UI Qty | 4.000 | 4.000 | 4.000 | 4.000 | 4.000 | 4.000 |
| UI- | 4.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

**Required Qty:** 1.6000 **Qty/Pkg:** 1.000 **Order qty:** 8.000 **Pkgs:** 8

Figure 10. Time-Phased ReSupply Sorted by Supply Then Functional Area

The Time-Phased ReSupply Sorted by Supply Totaled Across Functional Area – Unit of Issue report (see Figure 11) totals the quantity of each supply across all FAs. Each supply is listed in alphabetical order, and the quantities allotted for each period appear across the report in UI amounts, not UM, because using this method prevents accumulation of unnecessary inventory.

Time Phased ReSupply sorted by supply totalled across FA UI

SWA Moderate

| Period1 | Period2 | Period3 | Period4 | Period5 | Period6 | Order Qty | Pkgs |
|---|---|---|---|---|---|---|---|
| **6505009857301** | **ACETAMINOPHEN TABLETS 0.325GM 1000S** | | | | | | |
| 8000.000 | 0.000 | 0.000 | 0.000 | 4000.000 | 0.000 | 12000.000 | 12 |
| **6510002036010** | **ADHESIVE TAPE SURG 12INx5YDS MOLESKIN** | | | | | | |
| 8.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 8.000 | 8 |
| **6510000033058** | **ADHESIVE TIES SURG MONTGOMERY 11x 7IN 24S** | | | | | | |
| 48.000 | 96.000 | 96.000 | 96.000 | 96.000 | 48.000 | 480.000 | 20 |
| **6515013215211** | **AIRWAY KIT PERCUTANEOUS EMERGENCY ADULT 1S** | | | | | | |
| 6.000 | 4.000 | 2.000 | 4.000 | 6.000 | 0.000 | 22.000 | 22 |
| **6515011295437** | **AIRWAY NASOPHARYNGEAL 28FR 10S** | | | | | | |
| 60.000 | 0.000 | 20.000 | 0.000 | 20.000 | 0.000 | 100.000 | 10 |
| **6515011676637** | **AIRWAY NASOPHARYNGEAL ROBERTAZZI 30FR 12S** | | | | | | |
| 96.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 96.000 | 8 |
| **6515009582232** | **AIRWAY PHARYNGEAL BERMAN DESIGN 80MM 12S** | | | | | | |
| 96.000 | 0.000 | 0.000 | 0.000 | 48.000 | 48.000 | 192.000 | 16 |
| **6515011649637** | **AIRWAY PHARYNGEAL CUT AWAY FLANGE 30FR 30S** | | | | | | |
| 420.000 | 0.000 | 60.000 | 0.000 | 60.000 | 60.000 | 600.000 | 20 |
| **6505011169245** | **ALBUTEROL INHALATION 17GM CONT 200 SPRAYS** | | | | | | |
| 6.000 | 2.000 | 2.000 | 2.000 | 4.000 | 0.000 | 16.000 | 16 |
| **6505011464268** | **ALUMINUM CHLORIDE HEXAHYDRATE SOL 37 ML BT** | | | | | | |
| 4.000 | 0.000 | 0.000 | 4.000 | 0.000 | 0.000 | 8.000 | 8 |
| **6505014731770** | **ALUMINUM MAGNESIUM TABS 100S** | | | | | | |
| 800.000 | 0.000 | 0.000 | 0.000 | 800.000 | 0.000 | 1600.000 | 16 |
| **6505013038962** | **AMOXICILLIN & POTASSIUM CLAVULANATE 100S** | | | | | | |
| 400.000 | 0.000 | 400.000 | 400.000 | 0.000 | 400.000 | 1600.000 | 16 |

Figure 11. Time-Phased ReSupply Sorted by Supply Totaled Across Functional Area – Unit of Issue report.

This report is useful for ordering supplies because it gives a total number for each required supply, in both the UM and the package quantity.

## Consumption Simulator

To run the Consumption Simulator, the second function of RSVP, users select a patient stream and an inventory of medical supplies, then time phase patient arrival and supply delivery over a series of time intervals. The Consumption Simulator evaluates how that inventory performs by simulating the consumption of its supplies as a particular patient stream arrives into the health care system. It has three screens: Scenario, Schedule Patients, and Evaluate.

### The Scenario Screen

In the Scenario screen (see Figure 12), the user inputs the number of casualties, the number of days for the scenario, and the number of periods. Next, the user selects the scenario from which to generate the patient stream.

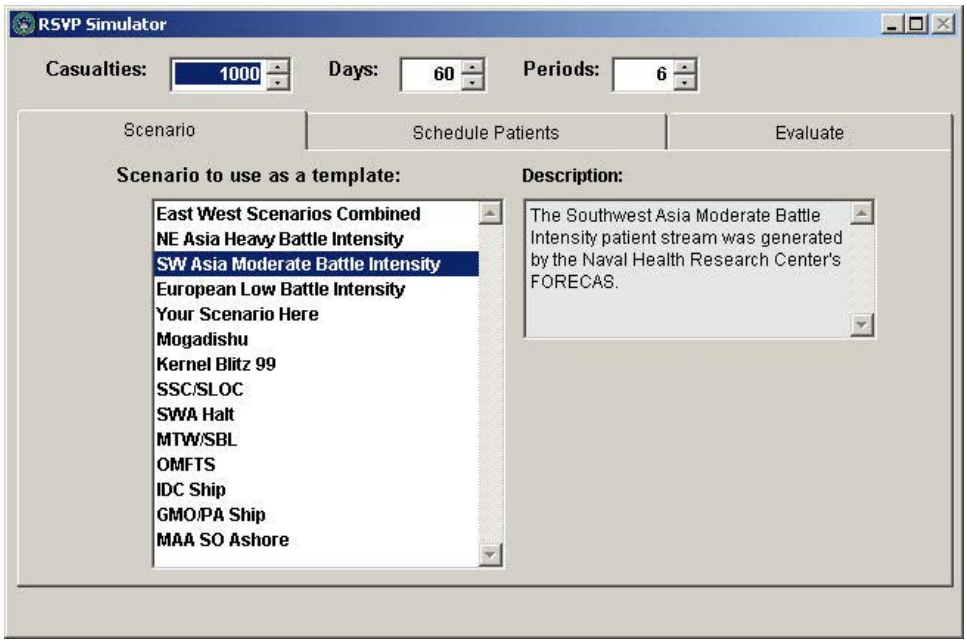


Figure 12. The Scenario screen for the Consumption Simulator.

### The Schedule Patients Screen

The user then clicks the Schedule Patients tab and enters the number of casualties expected to arrive in each period over the length of the scenario. Once the quantities are entered, RSVP displays a bar graph showing the user's selection. At this point, the user can modify the patient schedule, which also changes the graph upon leaving the grid, ensuring the changes total 100%.

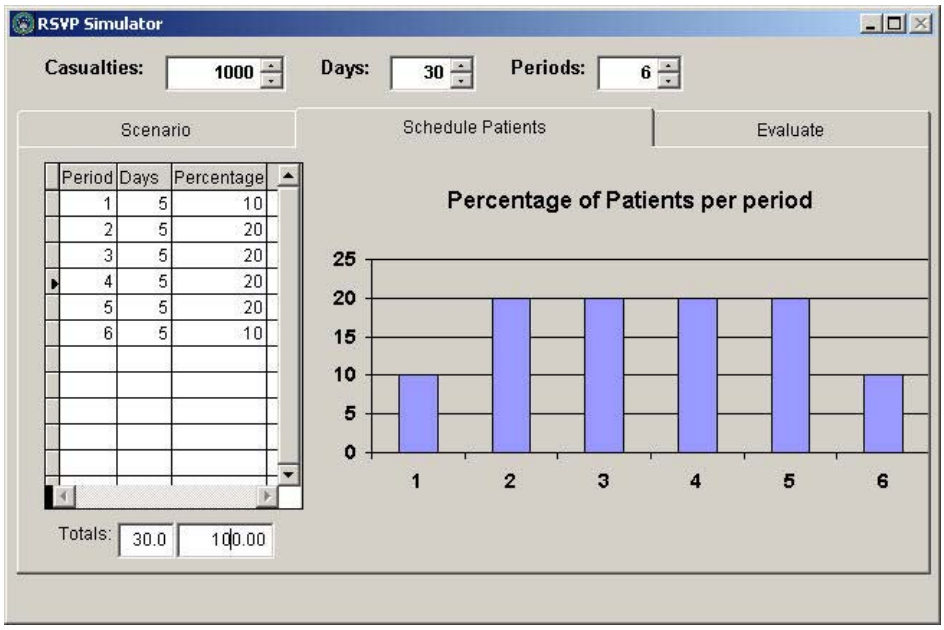


Figure 13. The Schedule Patients screen.

### The Evaluate Screen

The user then clicks the Evaluate tab, selects the inventory to evaluate, and clicks the Evaluate button (see Figure 14).

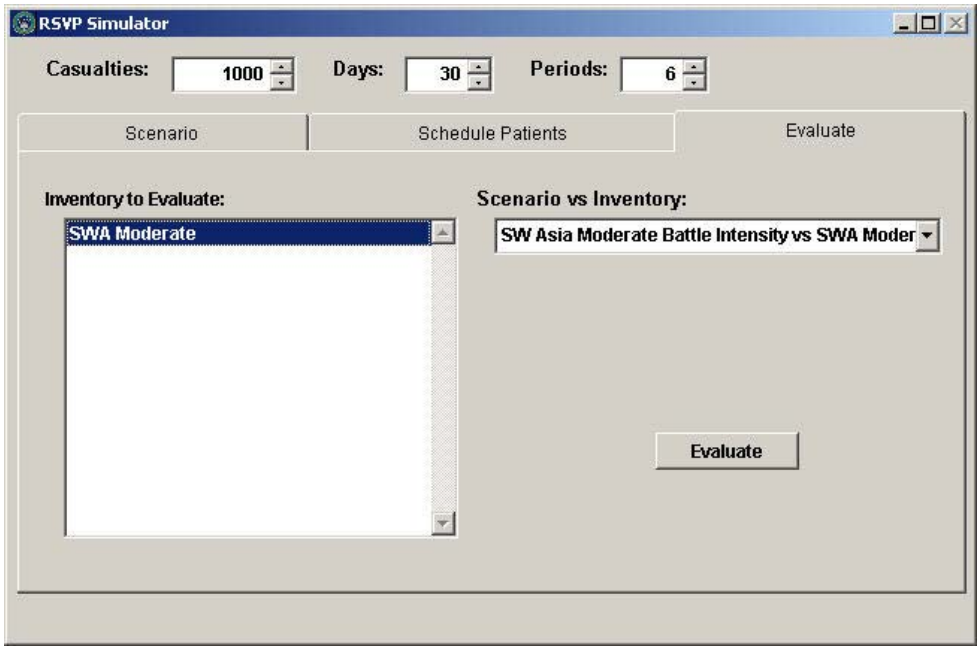


Figure 14. The Evaluate screen.

RSVP generates the patient stream based on the percentages of occurrence for each PC in the selected scenario and then calculates the supply demands for each period. RSVP uses the number of casualties expected in each time period to decrement the supply quantity in the inventory in order of patient arrival and treatment task completion.

For example, going back to the Schedule Patients screen (Figure 13), 10% of the patients, or 20 patients, are expected to occur in period 1. RSVP gets the supplies for period 1. As each patient comes through, the supply quantities required to treat those patients are decremented. When period 2 begins, RSVP gets the supplies for period 2. As the 21st patient comes through, RSVP decrements the supplies. This process is repeated for all periods.

Once the consumption simulation is complete, the user can view the reports by selecting Reports under the Analyze pull-down menu.

## Simulation Reports

There are 13 different Simulation Reports. These, too, are separated by information concerning patient stream and supplies.
The scenario and patient description reports are:

- Simulation Descriptions
- Arrival Time Distributions by Hour and Day
- Patient Condition Distributions
- Patient Stream Log (also details supply usage)

The reports detailing lists of supplies for the patient stream are:

- Supply Depletions During Simulation
- Supply Depletions Summary
- Supply Usage Detailed by Patient Condition
- Supply Usage Summarized by Functional Area
- Supply List (UM) Sorted by Functional Area Then Supply
- Supply Quantity Delivery and Consumption – Depleted Supplies
- Supply List UM, UI, UI Reduced Sorted by Supply Then Functional Area
- Supply List UM, UI, UI Reduced and Supply Consumption
- Supply List UI Reduced by Period Sorted by Functional Area Then Supply

Descriptions of the simulation appear in the Simulation Descriptions report (see Figure 15), including the number of days in the scenario and how many patients are expected to be treated.

Simulation Descriptions

| | |
|---|---|
| Simulation: | SW Asia Moderate Battle Intensity vs SWA |
| Days: | Moderate |
| Patients: | 30 |
| | 1000 |
| Scenario: | SW Asia Moderate Battle Intensity |
| | The Southwest Asia Moderate Battle Intensity patient stream was generated by the Naval Health Research Center's FORECAS. |
| Inventory: | SWA Moderate |
| | SWA Moderate |

Figure 15. Simulation Descriptions report.

The patient stream is broken down into a schedule in the Arrival Time Distributions by Hour and Day report (see Figure 16). This report shows how the patient stream looks each day of the scenario.

Simulation: SW Asia Moderate Battle Intensity vs SWA Moderate
Inventory: SWA Moderate vs. Scenario: SW Asia Moderate Battle Intensity

| Day | Hour | Patients |
|---|---|---|
| 1 | 1 | 1 |
| 1 | 4 | 2 |
| 1 | 7 | 3 |
| 1 | 11 | 2 |
| 1 | 12 | 1 |
| 1 | 14 | 2 |
| 1 | 15 | 1 |
| 1 | 17 | 2 |
| 1 | 18 | 1 |
| 1 | 20 | 1 |
| 1 | 21 | 1 |
| 1 | 23 | 2 |
| 1 | total | 19 |
| 2 | 1 | 1 |
| 2 | 2 | 2 |
| 2 | 4 | 1 |
| 2 | 5 | 1 |
| 2 | 6 | 1 |
| 2 | 7 | 1 |
| 2 | 9 | 3 |
| 2 | 10 | 1 |

| Day | Hour | Patients |
|---|---|---|
| 4 | 19 | 1 |
| 4 | 21 | 1 |
| 4 | 22 | 1 |
| 4 | 23 | 1 |
| 4 | 24 | 1 |
| 4 | total | 20 |
| 5 | 1 | 1 |
| 5 | 3 | 1 |
| 5 | 6 | 2 |
| 5 | 8 | 3 |
| 5 | 10 | 1 |
| 5 | 11 | 2 |
| 5 | 12 | 2 |
| 5 | 13 | 1 |
| 5 | 14 | 5 |
| 5 | 17 | 1 |
| 5 | 19 | 1 |
| 5 | 20 | 5 |
| 5 | 22 | 1 |
| 5 | 23 | 1 |
| 5 | total | 27 |

| Day | Hour | Patients |
|---|---|---|
| 7 | 12 | 3 |
| 7 | 13 | 1 |
| 7 | 14 | 1 |
| 7 | 15 | 1 |
| 7 | 17 | 4 |
| 7 | 18 | 1 |
| 7 | 19 | 3 |
| 7 | 20 | 3 |
| 7 | 21 | 1 |
| 7 | 22 | 2 |
| 7 | 24 | 1 |
| 7 | total | 36 |
| 8 | 1 | 1 |
| 8 | 2 | 2 |
| 8 | 3 | 4 |
| 8 | 4 | 2 |
| 8 | 5 | 1 |
| 8 | 6 | 1 |
| 8 | 8 | 1 |
| 8 | 9 | 1 |
| 8 | 11 | 2 |

Figure 16. Arrival Time Distributions by Hour and Day report.

Planners can find out which PCs are included in the scenario on the Patient Condition Distributions report (see Figure 17), which shows patients' arrival day, length of stay, and how many cases per PC. The list is arranged by PC, and shows

when in the scenario that patient will arrive, how long their care is expected to take, and how many patients with that condition to expect. Personnel needs may be calculated with this report, since it gives insight into supplies and personnel needed from the perspective of what kind of injuries will need to be treated.

Simulation: SW Asia Moderate Battle Intensity vs SWA Moderate
Inventory: SWA Moderate vs. Scenario: SW Asia Moderate Battle Intensity

Patient Condition Distribution

| | Patient Condition | Arrival day From | Arrival day to | Number of Patients |
|---|---|---|---|---|
| 1 | CEREBRAL CONCUSSION CLOSED WITH/WITHOUT NONDEPRESSED LINEAR SKULL FRACTURE SEVERE - LOSS OF CONSCIOUSNESS FROM 2 TO 12 HOURS | 22 | 24 | 1 |
| 2 | CEREBRAL CONCUSSION CLOSED WITH/WITHOUT NONDEPRESSED LINEAR SKULL FRACTURE MODERATE - LOSS OF CONSCIOUSNESS LESS THAN 2 HOURS | 9 | 29 | 8 |
| 4 | CEREBRAL CONTUSION CLOSED WITH/WITHOUT NONDEPRESSED LINEAR SKULL FRACTURE MODERATE - LOSS OF CONSCIOUSNESS FROM 12-24 HOURS WITHOUT FOCAL NEUROLOGICAL DEFICIT | 10 | 10 | 1 |
| 13 | WOUND SCALP OPEN WITHOUT CEREBRAL INJURY OR SKULL FRACTURE SEVERE - SCALPED WITH AVULSION OF TISSUE | 6 | 24 | 7 |
| 14 | WOUND SCALP OPEN WITHOUT CEREBRAL INJURY OR SKULL FRACTURE MODERATE - SCALP LACERATION | 4 | 32 | 11 |
| 17 | WOUND FACE JAWS AND NECK OPEN LACERATED WITH ASSOCIATED FRACTURES EXCLUDING SPINAL FRACTURES SEVERE - WITH AIRWAY OBSTRUCTION | 12 | 25 | 2 |
| 18 | WOUND FACE JAWS AND NECK OPEN LACERATED WITH ASSOCIATED FRACTURES EXCLUDING SPINAL FRACTURES MODERATE - WITHOUT AIRWAY OBSTRUCTION; EYELID AND EYEBALL LACERATION WITH RETAINED INTRAOCULAR FOREIGN BODY | 6 | 26 | 4 |

Figure 17. Patient Condition Distributions report.

The Supply Depletions Summary report (see Figure 18) shows how many supplies will be depleted daily as an aggregate, not as individual pieces. This will tell the user at a glance when the largest supply depletions will occur, giving an indication of how to adjust the distribution of supplies.

Supply Depletions Summary

| Inventory Depletion Days | Number of Supplies Depleted |
|---|---|
| zero | 2 |
| 1 to 5 | 160 |
| 6 to 10 | 100 |
| 11 to 15 | 71 |
| 16 to 20 | 233 |
| 21 to 25 | 102 |
| 26 to 30 | 142 |

Figure 18. Supply Depletions Summary report.

The Supply Usage Detailed by Patient Condition report (see Figure 19) tracks supplies. Arranged alphabetically by supply, it then lists each FA and which PCs will be treated there. Also included is how many of an individual supply each PC requires, and the total used. This gives users the ability to go supply by supply and evaluate how many of each are needed and for which conditions.

Simulation: SW Asia Moderate Battle Intensity vs SWA Moderate
Inventory: SWA Moderate vs. Scenario: SW Asia Moderate Battle Intensity

Supply Usage Detailed by Patient Condition

**6505009857301 ACETAMINOPHEN TABLETS 0.325GM 1000S**

**1RSP First Responder - Medical**

| Patient Condition | | Uses | Total used |
|---|---|---|---|
| 014 | WOUND SCALP OPEN WITHOUT CEREBRAL INJURY OR SKULL FRACTURE MODERATE - SCALP LACERATION | 11.00 | 66.0 |
| 213 | CYST/ABSCESS ALLCASES INCLUDING MINOR INCISION | 1.00 | 30.0 |
| 219 | HYPERHIDROSIS ALL CASES | 2.00 | 40.0 |
| 234 | BRONCHITIS ACUTE ALL CASES | 9.00 | 216.0 |
| 239 | ACUTE RESPIRATORY DISEASE SEVERE | 3.00 | 72.0 |
| 240 | ACUTE RESPIRATORY DISEASE MODERATE | 6.00 | 144.0 |
| 260 | PHLEBITIS DEEP VEIN INVOLVEMENT | 1.00 | 20.0 |
| 278 | RENAL/URETERAL CALCULUS NOT CAUSING OBSTRUCTION | 4.00 | 96.0 |
| 332 | MALARIA MODERATE - ALL SPECIES | 13.00 | 260.0 |
| 348 | EYE WOUND DIRECTED ENERGY INDUCED (LASER) MODERATE NONMACULAR, NONOPTIC NERVE, NO VITREOUS BLOOD. | 1.00 | 20.0 |
| 349 | EYE WOUND DIRECTED ENERGY INDUCED (LASER/RFR) MILD TO MODERATE, ANTERIOR, PAIN WITH PHOTOPHOBIA AND DISRUPTION OF CORNEAL INTEGRITY. | 2.00 | 40.0 |

**BAS Battalion Aid Station**

| Patient Condition | | Uses | Total used |
|---|---|---|---|
| 014 | WOUND SCALP OPEN WITHOUT CEREBRAL INJURY OR SKULL FRACTURE MODERATE - SCALP LACERATION | 11.00 | 66.0 |
| 023 | HEARING IMPAIRMENT SEVERE | 1.00 | 6.0 |
| 024 | HEARING IMPAIRMENT MODERATE | 3.00 | 18.0 |

Figure 19. Supply Usage Detailed by Patient Condition report.

The Supply Depletions during Simulation report (see Figure 20) details, by supply, when in the mission each supply will run out. The report gives a day-by-day accounting, beginning with those supplies that will be depleted first. This report is useful for evaluating how well the inventory stocks the scenario, and for determining which supplies will need to be reordered first.

SW Asia Moderate Battle Intensity vs
Supply Depletions During Simulation

| Nsn | Nomen | Quantity Estimated | Quantity Required | ECD | Depl Day |
|---|---|---|---|---|---|
| 6530011075798 | BAG STERILIZATION-BIOHAZ DISP 36x24IN 200S | 2000.00 | 549.75 | D | 0 |
| 6530011832863 | CONTAINER DISPOSE HYPO NDL & SYR 6.9QT 12S | 0.00 | 102.57 | D | 0 |
| 6640011079169 | DETERGENT GLASSWARE & INSTRUMENTS ALCONOX 4LB | 256.00 | 279.71 | C | 0 |
| 6510014575844 | DRESSING BURN 8x18IN w/WATER-GEL 20S | 480.00 | 124.00 | C | 0 |
| 6510002020800 | GAUZE PETROLATUM ACCORDION 18x3IN 12S | 240.00 | 131.50 | C | 0 |
| 6515012738647 | INTRODUCER SET CATHETER PERCUTANEOUS 4 COMP 2 | 94.00 | 147.75 | C | 0 |
| 6505010141378 | NEOMYCIN POLYMY HYDROCORT OTIC SOL 10ML | 0.00 | 20.00 | M | 0 |
| 6505004917557 | POVIDONE-IODINE CLEANSING SOL 7.5% 118ML | 6136.00 | 6119.75 | M | 0 |
| 6505012085955 | RANITIDINE INJ 25MG/ML 2ML SINGLE DOSE 10S | 0.00 | 14.00 | M | 0 |
| 6515003865800 | TUBE STOMACH LAVAGE w/FUNNEL 30FR 60 IN LG 1S | 0.00 | 0.00 | C | 0 |
| 6515012346838 | APPLICATOR DISP SQUARED OFF TIP 100S | 0.00 | 545.00 | C | 1 |
| PN18029940503 | BAG PLASTIC RESEALABLE ZIPLOCK 6x9IN 200S | 800.00 | 512.00 | C | 1 |
| 6510009355822 | BANDAGE ELASTIC ROLLED ACE 4INx4.5YDS 12S | 0.00 | 370.69 | C | 1 |
| 6510000583047 | BANDAGE GAUZE KERLIX 4.5IN x 4YDS 100S | 7800.00 | 5576.50 | C | 1 |
| 6135009857845 | BATTERY NONRECHARGABLE 1.5V AA 24S | 4560.00 | 1909.00 | D | 1 |
| 7530002223525 | BOOK,MEMORANDUM,10.5x8",RULED,192PAGES | 0.00 | 698.25 | C | 1 |
| 6515013909627 | CATHETER & NEEDLE UNIT IV 14GAx1.25IN 200S | 3200.00 | 1283.30 | C | 1 |
| 6515013909650 | CATHETER & NEEDLE UNIT IV 20GAx1.25IN 200S | 1600.00 | 187.45 | C | 1 |
| 6505014802501 | CEFAZOLIN INJECTION 1GM VIAL 25S | 1000.00 | 1398.20 | M | 1 |
| 6505012426532 | CEFOTETAN DISODIUM STERILE 2GM VIAL 10S | 440.00 | 373.20 | M | 1 |
| 6505012192760 | CEFTRIAXONE SODIUM 1GM VIAL 10S | 260.00 | 572.80 | M | 1 |
| 6530014604782 | CONTAINER SHARPS FOLD-FLAT 5 LITER 25S | 300.00 | 111.75 | D | 1 |
| 6515013738659 | COVER ELECTRONIC THERMOMETER DISP 100S | 2400.00 | 2033.00 | C | 1 |
| 6530000000070 | CUP MEDICINE PLAS 1 OZ POLYPROPOLENE 5000S | 0.00 | 729.00 | C | 1 |
| 6840014763011 | DISINFECTANT INSTRUMENT SURG CIDEX OPA 1GL 4S | 8192.00 | 4810.00 | C | 1 |
| 6550010754011 | FECAL SPECIMAN COLLECT/PREPARAT KIT 20S | 0.00 | 299.00 | C | 1 |

Figure 20. Supply Depletions During Simulation report.

Users may want to know how each supply is distributed across FAs. The Supply Usage Summarized by Functional Area report (see Figure 21) arranges that information first by FA, then alphabetically by supply, and again lists totals used. This enables users to quickly go down their inventory list by supply.

Simulation: SW Asia Moderate Battle Intensity vs SWA Moderate
Inventory: SWA Moderate vs. Scenario: SW Asia Moderate Battle Intensity

Supply Usage Summarized by Functional Area

| | Functional Area | Uses | Total used |
|---|---|---|---|
| 6505009857301 | ACETAMINOPHEN TABLETS 0.325GM 1000S | | |
| | 1RSP First Responder - Medical | 53.00 | 1004.0 |
| | BAS Battalion Aid Station | 146.00 | 2966.0 |
| | SC Triage/SST | 14.00 | 38.0 |
| | SC Ward | 48.00 | 948.0 |
| | **Total for ACETAMINOPHEN TABLETS 0.325GM 1000S** | | **4956.0** |
| 6515010701497 | ADAPTER INJECTION SITE SODIUM LOCK | | |
| | SC Triage/SST | 141.00 | 90.0 |
| | SC Ward | 69.00 | 8.0 |
| | **Total for ADAPTER INJECTION SITE SODIUM LOCK** | | **98.0** |
| 6515008801832 | ADAPTER RIGHT ANGLE ELBOW TRACHEAL ANESTHESIA | | |
| | SC Operating Room | 198.00 | 102.0 |
| 6515008801833 | ADAPTER Y-PIECE TRACHEAL ANESTHESIA SET CATHE | | |
| | SC Operating Room | 198.00 | 102.0 |
| 6505013809548 | ADENOSINE INJ 3MG/ML 2ML SINGLE DOSE VIAL 10S | | |
| | SC Triage/SST | 84.00 | 90.0 |
| 6510002036010 | ADHESIVE TAPE SURG 12INx5YDS MOLESKIN | | |
| | 1RSP First Responder - Medical | 3.00 | 0.6 |
| | BAS Battalion Aid Station | 3.00 | 0.6 |
| | SC Triage/SST | 2.00 | 0.4 |
| | **Total for ADHESIVE TAPE SURG 12INx5YDS MOLESKIN** | | **1.6** |

Figure 21. Supply Usage Summarized by Functional Area report.

Unit of measure (UM) is the amount of each supply required to treat the patient stream. The Supply List (UM) Sorted by Functional Area Then Supply report (see Figure 22) sorts supplies first by FA, then by supply. The list gives the per package amount and the quantity required by the scenario, which allows users to see how each FA will be stocked.

Simulation: SW Asia Moderate Battle Intensity vs SWA Moderate
Inventory: SWA Moderate vs. Scenario: SW Asia Moderate Battle Intensity

Supply List (UM) sorted by FA then Supply

SWA Moderate

**1RSP First Responder - Medical**

| Nsn | Nomen | per Pkg | Quantity |
|---|---|---|---|
| 6505009857301 | ACETAMINOPHEN TABLETS 0.325GM 1000S | 1000.00 | 2278.00 |
| 6510002036010 | ADHESIVE TAPE SURG 12INx5YDS MOLESKIN | 1.00 | 0.80 |
| 6515011676637 | AIRWAY NASOPHARYNGEAL ROBERTAZZI 30FR 12S | 12.00 | 10.80 |
| 6515009582232 | AIRWAY PHARYNGEAL BERMAN DESIGN 80MM 12S | 12.00 | 54.00 |
| 6515011649637 | AIRWAY PHARYNGEAL CUT AWAY FLANGE 30FR 30S | 30.00 | 43.20 |
| 6505014731770 | ALUMINUM MAGNESIUM TABS 100S | 100.00 | 467.00 |
| 6510012787002 | APPLICATOR IMPREG w/BENZOIN 4IN LG 50OS | 500.00 | 16.00 |
| 6515009051473 | APPLICATOR PLASTIC/WOOD ROD 6IN LG 2000S | 2000.00 | 192.50 |
| 6505001009985 | ASPIRIN TABS .32GM 100S (ACLS protocol only) | 100.00 | 7.00 |
| 6510009137909 | BANDAGE ADHESIVE FLESH 3x.75IN 30OS | 300.00 | 17.00 |
| 6510001055807 | BANDAGE ELASTIC COBAN FLESH 3" X 5YD 24S | 24.00 | 438.50 |
| 6510009355823 | BANDAGE ELASTIC ROLLED ACE 6INx4.5YDS 12S | 12.00 | 192.75 |
| 6510000583047 | BANDAGE GAUZE KERLIX 4.5IN x 4YDS 10OS | 100.00 | 2517.15 |
| 6510002011755 | BANDAGE MUSLIN CAMOUFLAGE 37x37x52IN 1S | 1.00 | 440.25 |
| 6505014213787 | BENZOCAINE MENTH CETYLPYRD LOZENGES 648S | 648.00 | 144.00 |
| 6505014437607 | BISMUTH SUBSALICYLATE TABLETS CHEWABLE 30S | 30.00 | 920.00 |
| 6515013909627 | CATHETER & NEEDLE UNIT IV 14GAx1.25IN 200S | 200.00 | 394.05 |
| 6515013909654 | CATHETER & NEEDLE UNIT IV 18GAx1.25IN 200S | 200.00 | 231.25 |
| 6515013909650 | CATHETER & NEEDLE UNIT IV 20GAx1.25IN 200S | 200.00 | 111.00 |
| 6505010235011 | CLOTRIMAZOLE CREAM USP 1% 15GM | 1.00 | 14.00 |
| 6530014644424 | COMPRESS COLD INSTANT NON-TOXIC 80S | 80.00 | 23.00 |

Figure 22. Supply List (UM) Sorted by Functional Area Then Supply report.

The Supply Quantity Delivery and Consumption – Depleted Supplies report (see Figure 23) shows how each supply will be decremented over the course of the scenario. It is broken down by FA, then alphabetically by supply. Each supply quantity is then shown over 6 periods. In this example, the supply quantity is delivered at the beginning of the scenario. This will show if enough of the supply has been ordered for the scenario.

Simulation: SW Asia Moderate Battle Intensity vs SWA Moderate
Inventory: SWA Moderate vs. Scenario: SW Asia Moderate Battle Intensity

Supply Quantity Delivery and Consumption - depleted supplies

**BAS Battalion Aid Station**

6515014211388 TUBE TRACHEAL ESOPHAGEAL COMBITUBE 41 FR 4S Units EA

Pkg Qty 4.000 Consumable **Day Depleted** 1.00

| | Period1 | Period2 | Period3 | Period4 | Period5 | Period6 | Total |
|---|---|---|---|---|---|---|---|
| Qty In | 16.000 | 32.000 | 16.000 | 32.000 | 16.000 | 16.000 | 128.000 |
| Qty Out | 3.000 | 6.000 | 11.000 | 6.000 | 7.000 | 3.000 | 36.000 |

**FRSS Pre-op**

XXXXXXXXXX2O FORM PRINTED RESUSCITATION TRAUMA 4-PAGES Units EA

Pkg Qty 1.000 Consumable **Day Depleted** 2.00

| | Period1 | Period2 | Period3 | Period4 | Period5 | Period6 | Total |
|---|---|---|---|---|---|---|---|
| Qty In | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Qty Out | 9.000 | 25.000 | 22.000 | 22.000 | 20.000 | 14.000 | 112.000 |

**FRSS Post-op**

XXXXXXXXXX2O FORM PRINTED RESUSCITATION TRAUMA 4-PAGES Units EA

Pkg Qty 1.000 Consumable **Day Depleted** 10.00

| | Period1 | Period2 | Period3 | Period4 | Period5 | Period6 | Total |
|---|---|---|---|---|---|---|---|
| Qty In | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Qty Out | 0.000 | 16.000 | 68.000 | 108.000 | 72.000 | 96.000 | 360.000 |

6545015099851 PACK POST-OP SURGICAL 3S Units EA

Pkg Qty 3.000 Consumable **Day Depleted** 11.00

| | Period1 | Period2 | Period3 | Period4 | Period5 | Period6 | Total |
|---|---|---|---|---|---|---|---|
| Qty In | 150.000 | 294.000 | 294.000 | 294.000 | 294.000 | 144.000 | 1470.000 |
| Qty Out | 0.000 | 24.000 | 102.000 | 156.000 | 114.000 | 144.000 | 540.000 |

Figure 23. Supply Quantity Delivery and Consumption – Depleted Supplies report.

To see how the patient stream uses supplies, the Patient Stream Log (see Figure 24) shows each FA and lists the supplies used in that area over the 6 periods. Supplies are grouped by medications, consumables, or durables, and the chart shows how many are available at the beginning and end of each period. It also indicates the day the supply will run out.

Patient Stream Log

**Patients** 53 Number Treated 53

First Responder - Medical

| Supply | | Qty |
|---|---|---|
| 6505009857301 | ACETAMINOPHEN TABLETS 0.325GM 1000S | 1004.0000 |

**Patients** 146 Number Treated 146

Battalion Aid Station

| Supply | | Qty |
|---|---|---|
| 6505009857301 | ACETAMINOPHEN TABLETS 0.325GM 1000S | 2966.0000 |

**Patients** 15 Number Treated 14

Triage/SST

| Supply | | Qty |
|---|---|---|
| 6505009857301 | ACETAMINOPHEN TABLETS 0.325GM 1000S | 42.0000 |

**Patients** 49 Number Treated 48

Ward

| Supply | | Qty |
|---|---|---|
| 6505009857301 | ACETAMINOPHEN TABLETS 0.325GM 1000S | 984.0000 |

**Patients** 142 Number Treated 141

Triage/SST

| Supply | | Qty |
|---|---|---|
| 6515010701497 | ADAPTER INJECTION SITE SODIUM LOCK | 91.0000 |

Figure 24. Patient Stream Log report.

To sort first by supply then by FA, the user can select the Supply List UM, UI, UI Reduced Sorted by Supply then Functional Area report (see Figure 25). This report views supplies across FAs, and shows quantities as they decrement according to patient usage. The UM, UI and UI reduced (UI-) amounts are broken out and listed by period. The user can then see where each supply is needed and how many will be needed to meet demand in all FAs.

Simulation: SW Asia Moderate Battle Intensity vs SWA Moderate
Inventory: SWA Moderate vs. Scenario: SW Asia Moderate Battle Intensity

Supply List UM,UI,UI reduced sorted by Supply then FA

**6505009857301 ACETAMINOPHEN TABLETS 0.325GM 1000S TB 1000.000**

1RSP First Responder - Medical

| | Qty1 | Qty2 | Qty3 | Qty4 | Qty5 | Qty6 | Total |
|---|---|---|---|---|---|---|---|
| UM Qty | 227.8000 | 455.6000 | 455.6000 | 455.6000 | 455.6000 | 227.8000 | 2278.00 |
| UI Qty | 4000.0000 | 4000.0000 | 4000.0000 | 4000.0000 | 4000.0000 | 4000.0000 | 24000.00 |
| UI reduced | 4000.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 4000.00 |

BAS Battalion Aid Station

| | Qty1 | Qty2 | Qty3 | Qty4 | Qty5 | Qty6 | Total |
|---|---|---|---|---|---|---|---|
| UM Qty | 544.0000 | 1088.0000 | 1088.0000 | 1088.0000 | 1088.0000 | 544.0000 | 5440.00 |
| UI Qty | 4000.0000 | 4000.0000 | 4000.0000 | 4000.0000 | 4000.0000 | 4000.0000 | 24000.00 |
| UI reduced | 4000.0000 | 0.0000 | 0.0000 | 0.0000 | 4000.0000 | 0.0000 | 8000.00 |

**6510002036010 ADHESIVE TAPE SURG 12INx5YDS MOLESKIN RL 1.000**

1RSP First Responder - Medical

| | Qty1 | Qty2 | Qty3 | Qty4 | Qty5 | Qty6 | Total |
|---|---|---|---|---|---|---|---|
| UM Qty | 0.0800 | 0.1600 | 0.1600 | 0.1600 | 0.1600 | 0.0800 | 0.80 |
| UI Qty | 4.0000 | 4.0000 | 4.0000 | 4.0000 | 4.0000 | 4.0000 | 24.00 |
| UI reduced | 4.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 4.00 |

BAS Battalion Aid Station

| | Qty1 | Qty2 | Qty3 | Qty4 | Qty5 | Qty6 | Total |
|---|---|---|---|---|---|---|---|
| UM Qty | 0.0800 | 0.1600 | 0.1600 | 0.1600 | 0.1600 | 0.0800 | 0.80 |
| UI Qty | 4.0000 | 4.0000 | 4.0000 | 4.0000 | 4.0000 | 4.0000 | 24.00 |
| UI reduced | 4.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 4.00 |

Figure 25. Supply List UM, UI, UI Reduced Sorted by Supply then Functional Area report

The rate of consumption is easily viewed in the Supply List UM, UI, UI Reduced and Supply Consumption report (see Figure 26). It lists supplies in alphabetical order and charts decremented quantities throughout the scenario.

Simulation: SW Asia Moderate Battle Intensity vs SWA Moderate
Inventory: SWA Moderate vs. Scenario: SW Asia Moderate Battle Intensity

Supply List UM,UI,UI reduced and Supply Consumption

**1RSP First Responder - Medical**

| | | | | | | | **UM** | **Pkg Size** |
|---|---|---|---|---|---|---|---|---|
| 6505009857301 ACETAMINOPHEN TABLETS 0.325GM 1000S | | | | | | | TB | 1000.000 |
| Period | 1 | 2 | 3 | 4 | 5 | 6 | Total | **Qty Left** |
| UM Qty | 227.80 | 455.60 | 455.60 | 455.60 | 455.60 | 227.80 | 2278.00 | 1274.00 |
| UI Qty | 4000.00 | 4000.00 | 4000.00 | 4000.00 | 4000.00 | 4000.00 | 24000.00 | 22996.00 |
| In UI- | 4000.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4000.00 | 2996.00 |
| Out | 0.00 | 72.00 | 356.00 | 536.00 | 40.00 | 0.00 | 1004.00 | |

| | | | | | | | **UM** | **Pkg Size** |
|---|---|---|---|---|---|---|---|---|
| 6510002036010 ADHESIVE TAPE SURG 12INx5YDS MOLESKIN | | | | | | | RL | 1.000 |
| Period | 1 | 2 | 3 | 4 | 5 | 6 | Total | **Qty Left** |
| UM Qty | 0.08 | 0.16 | 0.16 | 0.16 | 0.16 | 0.08 | 0.80 | 0.20 |
| UI Qty | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 24.00 | 23.40 |
| In UI- | 4.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.00 | 3.40 |
| Out | 0.00 | 0.00 | 0.00 | 0.00 | 0.60 | 0.00 | 0.60 | |

Figure 26. Supply List UM, UI, UI Reduced and Supply Consumption report.

Sorting by FA then supply, the Supply List UI Reduced by Period Sorted by Functional Area Then Supply report (see Figure 27) quickly shows the inventory of supplies at each FA, and how many will be available by period. If they are all scheduled to arrive at the beginning of the scenario, the list will look more like Figure 26, in which the majority of supplies are grouped in period 1.

Simulation: SW Asia Moderate Battle Intensity vs SWA Moderate
Inventory: SWA Moderate vs. Scenario: SW Asia Moderate Battle Intensity

Supply List UI reduced by Period sorted by FA then Supply

1RSP First Responder - Medical

| Supply | | Period 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| 6505009857301 | Acetaminophen Tablets 0.325gm 1000s | 4000.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6510002036010 | Adhesive Tape Surg 12inx5yds Moleskin | 4.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6515011676637 | Airway Nasopharyngeal Robertazzi 30fr 12s | 48.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6515009582232 | Airway Pharyngeal Berman Design 80mm 12s | 48.00 | 0.00 | 0.00 | 0.00 | 48.00 | 0.00 |
| 6515011649637 | Airway Pharyngeal Cut Away Flange 30fr 30s | 120.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6505001161120 | Sodium Chloride Injection 500ml 12s | 48.00 | 0.00 | 48.00 | 48.00 | 0.00 | 48.00 |
| 6505011533024 | Ringer's Injection Lactated Usp 500 Ml 12s | 48.00 | 0.00 | 48.00 | 48.00 | 0.00 | 48.00 |
| 6510012787002 | Applicator Impreg W/benzoin 4in Lg 500s | 2000.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6515009051473 | Applicator Plastic/wood Rod 6in Lg 2000s | 8000.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6505001009985 | Aspirin Tabs .32gm 100s (acls Protocol Only) | 400.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6510002011755 | Bandage Muslin Camouflage 37x37x52in 1s | 48.00 | 88.00 | 88.00 | 88.00 | 88.00 | 44.00 |
| 6510009137909 | Bandage Adhesive Flesh 3x.75in 300s | 1200.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6510001055807 | Bandage Elastic Coban Flesh 3" X 5yd 24s | 96.00 | 96.00 | 96.00 | 96.00 | 96.00 | 0.00 |
| 6510009355823 | Bandage Elastic Rolled Ace 6inx4.5yds 12s | 48.00 | 48.00 | 48.00 | 0.00 | 48.00 | 48.00 |
| 6510000583047 | Bandage Gauze Kerlix 4.5in X 4yds 100s | 400.00 | 400.00 | 800.00 | 400.00 | 400.00 | 400.00 |
| 6505014213787 | Benzocaine Menth Cetylpyrd Lozenges 648s | 2592.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6515013909627 | Catheter & Needle Unit Iv 14gaxl.25in 200s | 800.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6515013909654 | Catheter & Needle Unit Iv 18gaxl.25in 200s | 800.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6515013909650 | Catheter & Needle Unit Iv 20gaxl.25in 200s | 800.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6505010235011 | Clotrimazole Cream Usp 1% 15gm | 4.00 | 4.00 | 0.00 | 4.00 | 4.00 | 0.00 |
| 6515013738659 | Cover Electronic Thermometer Disp 100s | 400.00 | 0.00 | 0.00 | 0.00 | 0.00 | 400.00 |

Figure 27. Supply List UI Reduced by Period Sorted by Functional Area Then Supply report.

## Discussion

You can use RSVP for planning, scheduling, and ordering the optimal configuration and delivery of supplies for any type of operation. Based on estimated patient streams, RSVP identifies those supply items that are considered high use, which can assist in developing likely resupply configurations. RSVP can benefit the Navy and Marine Corps by:

- Decreasing the medical logistics footprint ashore.
- Reducing costs of acquiring, storing, and maintaining medical assets.
- Decreasing on-hand quantities of supplies and inventory holding costs.
- Reducing personnel needs associated with storing, maintaining, and inventorying medical supplies.
- Pushing forward the high frequency usage supply items.

## Conclusion

RSVP is a planning tool that can help prepare for operational missions, providing insight into whether an inventory is sufficient for a patient stream. The user can define scenario parameters, including casualty numbers, days in theater, medical treatment facilities, and supply delivery schedules to approximate an operation. Using those user-defined parameters to model a patient stream that might flow through the health care system, RSVP generates an inventory and simulates its consumption.

To simulate inventory consumption, RSVP time phases the arrival of a particular patient stream and supply delivery as they might actually occur. This enables RSVP to show whether or not a supply delivery schedule can successfully accommodate the arrival of a particular patient stream. It tracks shortages and excesses in the supply inventory, identifying when in the scenario an individual supply becomes exhausted, as well as the patient who consumed it.

RSVP provides a more precise method for reordering supplies, because it details the quantity (in unit of issue and unit of measure) of each supply delivered, used, and overstocked for each time interval in the delivery schedule.

RSVP generates a variety of reports to address as wide a variety of users' concerns as possible.

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To help the United States Marine Corps streamline its medical materiel, the Naval Health Research Center expanded the Estimating Supplies Program (ESP) into the ReSupply Validation Program (RSVP) to link medical materiel to a defined patient stream. RSVP is a simulation program that validates medical supply configurations by stochastically generating multiple iterations of a patient stream, generating the supplies necessary to treat the patients, and comparing these needs with a time-phased inventory. This document explains what RSVP does, how it works, and why it is useful for the medical planning and logistics communities.

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